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ABSTRACT

Teaching invention strategies on the computer offers solutions to the problems of selection and presence by providing a variety of invention strategy alternatives. These strategies inform the teacher of the rhetorical task at hand and allow communication to exist at all stages of writing. A writer using a computer and a pool of heuristic applications has available a range of strategies appropriate to both different rhetorical situations and to various moments within the writing process. The computer can help the writer to become more aware of options by prompting with a series of randomly selected heuristics, allowing the teacher to intervene earlier and more effectively in the writing process than is typically the case. An assignment programmed into the computer enables the writer to begin the heuristic activity immediately and the teacher to be present, influencing how student writers first represent the writing problem to themselves. The computer allows teachers to offer a variety of heuristic strategies and to be present to the writer at the time when most needed--during the composing process itself. The computer changes the way teacher and student approach writing by representing it as invention centered and process oriented. Twenty-four references are listed. (Author/JD)

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ABSTRACT

PROBLEMS AND PROMISES: INVENTION ON THE COMPUTER

Teaching invention strategies on the computer offers solutions to the problems of selection and presence by providing a variety of invention strategy alternatives, informed by the rhetorical task at hand and the writer's representation of that task, and by intervening at all stages of the writing process.

A writer, using a computer and an existing pool of heuristic applications, has available a range of strategies appropriate to different rhetorical situations and various moments within the writing process. The computer can help the writer to become more aware of options by prompting with a series of randomly selected heuristics: e.g., "why not try the LISTING strategy?" " why not try the TAGMEMIC strategy?"

This approach allows the teacher to intervene earlier and more effectively in the writing process than is typically the case (the first writing conferenced). An assignment programmed into the computer enables the writer to begin the heuristic activity immediately and the teacher to be present, influencing how student writers first represent the writing problem to themselves.

Invention and computing seem made for one another. The computer allows us to do what we have never been able, as teachers of writing, to do: offer a real smorgasbord of heuristic strategies and be present to the writer at the time when most needed, during the composing process itself. The computer changes the way teacher and student approach writing by representing it as invention-centered and process-oriented.

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PROBLEMS AND PROMISES: INVENTION ON THE COMPUTER

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By now, most of us as teachers of writing are aware of the importance of rhetorical invention, time spent thinking in structured or unstructured ways about an assignment, engaging "prewriting" processes often represented as previous to the transcription process though nevertheless recursive throughout the model of the composing act, as drawn by Linda Flower and John R. Hayes. Many of us make a conscientious effort to teach a number of invention strategies to our student writers: structured strategies--the journalistic 5 W's or the Pentad of Kenneth Burke, the tagmemic question matrix of Richard Young, Alton Becker, and Kenneth Pike, the classical topics of Aristotle, or the traditional modes of discourse used by Patrick Hartwell as invention probes--and unstructured strategies--the freewriting, brainstorming and journal-keeping of Peter Elbow, Ken Macrorie, and Gordon Rohman. But we are aware of two difficulties in trying to teach the benefits of rhetorical invention.

The first problem arises in selecting the heuristics, the problem-solving strategies employed to aid writers in exploring their topics under consideration and in discovering what to write about each topic. As teachers, we decide which strategies to teach, to model, to recommend, though our students are the ones doing the writing. As writers ourselves, we often teach favored strategies, from the various types of heuristic strategies available, because they work for us. And yet, we are not the

ones doing the writing and should not presume that what works for us will necessarily work for our students.

The second problem is that there is no real way possible for us to intervene in the process, unless we can find a magical way to be present to each student writer from the time a writing task is given as an assignment until the time the heuristic activity (or the first draft, or the second draft, and so forth) is handed in. We must admit that during the invention process, active throughout all stages of the composing process, student writers are on their own--even though we teach invention strategies, model their use, and ask to see the product of each various invention activity, and even though we use individual conferences, helping student writers at various points in the composing process, attempting to match our pedagogy with our knowledge of the writing process.

Teaching invention strategies on the computer offers solutions to the problems of selection and presence by providing a variety of invention strategy alternatives, informed by the rhetorical task at hand and the writer's representation of that task, and by intervening at all stages of the writing process.

THE PROBLEM OF SELECTING HEURISTICS

There is almost an infinite variety of invention strategies possible--an overabundance, one is tempted to say, considering the lighthearted mumbling, ceiling-staring, pencil-tapping "irrational heuristics" of Toby Fulwiler and Bruce Petersen. One

useful way to classify the variety of heuristics, the multitude of problem-solving activities designed for discovery, is the distinction, made by Nancy Rabianski, between systematic and unsystematic activities).

Systematic heuristics posit a number of relevant questions asked as probes to examine a topic. Three popular systematic heuristics are the tagmemic heuristic of Richard Young, Alton Becker, and Kenneth Pike, the topoi of Aristotle reformulated as a series of questions by Richard Larson, and the dramatistic questions, the Pentad, that Kenneth Burke asks of literary works, reformulated as a general device for invention by William Irmscher.

In contrast, unsystematic heuristics require the writer to approach a writing task more informally--by free-associating, by brainstorming, or by continuously writing whatever relevant ideas and/or digressions are brought to mind by the topic. Rather than positing a set of pre-determined questions, this heuristic relies on the chain of associations in the memory of the writer to retrieve information about a topic. Two unsystematic heuristics are free-writing--popularized by Peter Elbow and Ken Macrorie--and journal keeping--advanced by Gordon Rohman and James Moffett.

Given this range, instructors must usually choose one or two of the invention strategies to be taught. The teacher naturally chooses the ones which the teacher has found to be personally successful or successful with other classes. However, each type

of invention, and its numerous variations, works for a different approach to writing, for a different problem-solving style, and sometimes just for a different type of writing assignment. As a result, some students, usually those whose approach to writing, whose cognitive learning styles or whose assignment matches those of the strategy selected by the teacher, find heuristic activities very helpful. Others, those who are out of sync, report rhetorical invention a waste of time and, to be honest, never find anything of value in the activity.

However, many of these heuristic activities can be programmed for computer-assisted instruction. For example, a heuristic based on Aristotelian topics, developed for main-frame VAX computers by Hugh Burns of the Human Resources Lab at Lowry Air Force Base, is now available for Apple microcomputer use from a number of sources, including Anne Ruggles Gere of Washington State. Another variation of the Aristotelian approach to invention is CREATE, a CAInvention program developed by Valarie Arms of Drexel University. Hugh Burns' tagmemic program TAGI, again written for main-frame computers, is part of WRITER'S HELPER by William Wresch, now commercially available for microcomputer use. Various problem-solving strategies, named VISUAL SYNECTICS for the synectics approach of William Gordon, have been written as CAInvention programs by Dawn and Ray Rodrigues, presently at Colorado State University. Michael Spitzer, of New York Institute of Technology, has written BRAINSTORM, an authoring program to write topic-specific heuristic questions. The unsystematic approach to invention is

also represented in activities programmed for the computer. Wresch's WRITER'S HELPER contains a free-writing program, BRAINSTORMS, as does WANDAH, written by Ruth Von Blum and Michael Cohen, and WORDSWORK (aka WORDSWORTH II), written by Cynthia Selfe.

Ray Rodrigues suggests that one of the advantages of computer-assisted invention strategies is that the programs can be matched to the cognitive style of the user. For example, if the student writer is a global-divergent thinker, who has previously only been offered a choice of systematic heuristics, such as Young, Becker and Pike's tagmemic matrix or the questions of Aristotle's topics, then the writer might find rhetorical invention to be fruitless. However, the same writer using CAInvention programs could choose from a menu until she found a program which mapped the way she invented: possibly a variation of Rohman's prewriting, Elbow's free-writing, list-making, or brainstorming.

In a similar fashion, the heuristic could address a specific rhetorical problem. For example, the same student might, at some point in her work, feel a need to clarify her sense of audience. This student might remember that a particular heuristic strategy dealt with the question of audience but she would probably be more successful if she knew that, merely by calling up a menu on the computer, a strategy, designed to address that rhetorical question, would be available to her. For example, she could command the computer to run ORGANIZE by Helen Schwartz,

containing a program for AUDIENCE ANALYSIS as part of the menu, designed to help a writer consider her audience's educational background, values, and knowledge of and attitude toward her topic.

A writer, using a computer and an existing pool of heuristic applications, has available a range of strategies appropriate to different rhetorical situations and various moments within the writing process. The computer can help the writer to become more aware of options by prompting with a series of randomly selected heuristics: e.g., "why not try the LISTING strategy?" " why not try the TAGMEMIC strategy?"

Not only can the computer offer a wide variety of strategies from which to choose, but the computer has at this prewriting stage the same virtues it has in any computer-assisted instruction--it is patient and adaptable, demanding without being threatening.

Inevitably, students find teachers threatening. Many students feel under pressure when asked heuristic questions by a teacher, even if they were the ones who said "I don't know what to write," even if asked in the relaxed atmosphere of a writing conference. They answer quickly, often without thinking. Students report that they feel more comfortable with the computer. A computer can ask the same question a teacher would in the writing conference--for example,

SHARON [here inserting the student's name], we've considered

that NUCLEAR AWARENESS [here inserting Sharon's topic] in the past was A COMIC BOOK THREAT, UNREAL AND INCREDIBLE [here inserting Sharon's earlier answer]. Now, let's consider what NUCLEAR AWARENESS might become in the future. What do you think it might become?

The computer will wait for an answer without the implicit message flashing on its face--"hurry up, stupid." And yet, the computer is also demanding. The same question presented on a dittoed handout can just be skipped. The computer will wait for an answer until its electrodes rust. It can also look at the length of the answer and prompt, "more?", "go on," or "please continue." The uncooperative student soon learns that she can enter "garbage" for the answer and continue. However, the garbage (of the computer slang--garbage in/garbage out) returns to haunt the writer. The printout of the heuristic activity shouts evidence of the user's lack of success.

The computer is also adaptable. Just as it can be directed to follow one heuristic strategy from a menu of choices, it also offers a number of choices, or "branches," within a single program. For example, Sharon might be considering her topic, nuclear awareness, by answering questions about comparison/contrast, one of the enthymemes in an Aristotelian heuristic. If this exploration seems especially fruitful, she can direct the computer to continue in this mode, branching to more comparison questions. On the other hand, if Sharon answers the question and wishes to consider another enthymeme, the next

Aristotelian topic programmed into the computer's memory, she merely continues on the main branch. This adaptability cannot be matched by a dittoed set of questions. It can however be matched by a good teacher, always alert to new avenues and possible twists and curves. And yet, even the best teacher's alertness can fail, especially for the last conference of the hour, or of the day. The computer, its electricity on, its disk spinning, its input devices connected, is always ready.

THE PROBLEM OF PRESENCE

The more we learn about the complexities of the writing process, the more we become aware that our effectiveness as teachers is often dependent upon how early in the process we can intervene. Richard Larson traces the invention stage all the way back to the furrowing of the brow which first urges a writer to write. If possible, teachers of writing should be present at the first furrowing, but often must wait for the first draft. Invention on the computer offers the opportunity to be present.

This approach allows the teacher to intervene earlier and more effectively in the writing process than is typically the case (the first writing conferenced). An assignment programmed into the computer enables the writer to begin the heuristic activity immediately and the teacher to be present, influencing how student writers first represent the writing problem to themselves. Flower and Hayes, in "The Cognition of Discovery: Defining a Rhetorical Problem" make a convincing argument for concerning ourselves with how our student-writers represent the

writing problem. Good writers, they find, respond to a full rhetorical situation while weaker writers respond only to a topic or current item in memory. For example, Sharon logs onto the computer and is given a writing task--a task which asks her to compose an argumentative paper about the desirability of nuclear awareness programs in high school. The computer immediately begins a heuristic activity, before Sharon can call up her "argue for something" schema--her composite plan for writing school essays, compiled by arguing for any number of issues--birth control, better television programming, or capital punishment. Before Sharon can represent the problem the way she always does, the computer can ask her goal-setting questions or audience identification questions. These CAInvention programs expand Sharon's schema and suggest to her that writers do not keep re-writing the same essay, and that writers do not always follow Snoopy's advice, "stick with what sells." We, at last, have a way of being present at the beginning of the process and influencing problem representation. CAInvention programs can do even more to change writing habits. The computer, with a force beyond that of even the best teacher, would encourage students to spend time prewriting, an important change since the activity is one which many poor writers ignore completely. If poor compositions are the result of poor representation of the writing problem, an inability to consider the full rhetorical context of the writing task, or an inability to separate higher order concerns from lower order concerns, the computer affords the wherewithal to change the way writers represent the problem,

construct their rhetorical context, and deal with higher versus lower order concerns. If poor writers are the result of poor writing habits--and we have some reason to believe that they are--we now have the ability to teach writing habits which good writers use: spending what seems to the poorer writer an inordinant amount of time prewriting, free writing, problem solving, brainstorming, even doodling.

Unfortunately, even though Flower and Hayes and other cognitive researchers have emphasized that writing is a recursive process, many teachers and too many student writers act as though writing were still a linear process: prewriting, writing, revising. Teachers still ask to see "the prewriting" and ask for the "revised copy." Perhaps this distinction seems harmless, speaking metaphorically rather than scientifically, much like speaking of sunsets, knowing that the earth revolves around the sun. And yet speaking in a linear paradigm, we reinforce a model that suggests first we do the prewriting, next we write it, then we rewrite it. The computer can change this paradigm. Indeed, the computer offers a chance for all of us to become process-centered teachers, matching pedagogy to knowledge.

It is now possible to keep the option of heuristic activities available at all times during the writing process, just as the editing mode is always available. The writer who uses a computer/word-processor quickly becomes aware of the reality that revising is recursive. In the act of writing a sentence, the writer is aware that she can easily correct surface

errors as well as make global changes in the text. Writers who use a computer/word-processor gain a sense that electronic text, free floating and expendable, has a different "mode of existence", as Warren Selfe says, than that which is typed or handwritten, mechanically carved onto tablet, fixed and unchanging. Word-processing programs have broken writers free from the "first-write-then revise" paradigm. CAInvention programs afford the same possibility for the other side of the model--the prewriting process. A writer, once familiar with the heuristic options, will quickly become aware that at any given point in the writing process, she can cycle back into the invention mode to do some brainstorming, problem solving, or tagmemic probing. A writer can file the text-so-far, using a simple command to store what has been written onto a permanent memory sector on the floppy disk, and then call up the menu of heuristic strategies. Another possibility is to split the screen and work on the heuristic strategy in the top half of the screen while retaining the text-so-far on the lower half of the screen. A writer who encounters writer's block will learn that one solution is to cycle into invention or revision activities. The weaker writer who is still stuck in a linear model can take advantage of the computer's ability to do two things at once: attend to a writing/word-processing program and offer a menu of other options--heuristic strategies in this case--at the top or bottom of the screen. The poor writer would not only be able to use the techniques writing teachers have recommended, but would be reminded of the options available.

CAInvention can help solve the problem of presence by being immediate, by changing habits and modifying behavior, and by breaking free of the linear model.

Invention and computing seem made for one another. The computer allows us to do what we have never been able, as teachers of writing, to do: offer a real smorgasbord of heuristic strategies and be present to the writer at the time when most needed, during the composing process itself. The computer changes the way teacher and student approach writing by representing it as invention-centered and process-oriented. And the computer generates, with inexpensive dot-matrix printers, a record of heuristic activities, exercises, and drafts for teacher and student to use for the next writing conference or peer group activity. After all, teachers are not about to be replaced by computers for the obvious reason that, as one perceptive professor notes, there is nothing like a "live audience."

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